K123677

MAR 0 7 2013

510k Summary

Dimension Vista® Ammonia Flex® reagent cartridge (AMM)
Dimension Vista® Chem 3 Calibrator (CHEM 3 CAL)

This summary of 510(k) safety and effectiveness information is submitted in accordance with the requirements of SMDA 1990 and 21 CFR 807.92.

1. 510(k) Number

2. Applicant: Rose T. Marinelli
Siemens Healthcare Diagnostics, Inc.
P.O. Box 6101, Newark, DE 19714-6101
Office Number: 302-631-8805; Fax Number: 302-631-6299

3. Date: November 28, 2012

4. Proprietary and Established Names:

Dimension Vista® Ammonia Flex® reagent cartridge, (AMM)
Dimension Vista® Chem 3 Calibrator (CHEM 3 CAL)

5. Regulatory Information:

Ammonia (AMM) Flex® reagent cartridge

Regulation section: 21 CFR 862.1065 Enzymatic Method, Ammonia
Classification: Class I
Product Code: JIF
Panel: Clinical Chemistry

Chemistry 3 Calibrator (CHEM 3 CAL)

Regulation section: 21 CFR 862.1150 Calibrator, Secondary
Classification: Class II
Product Code: JIX
Panel: Clinical Chemistry

6. Predicate Devices:

The predicate device used to demonstrate substantial equivalence to the Dimension® Ammonia (AMM) Flex® reagent cartridge is the Dimension® Ammonia (AMON) previously cleared under k863840.

The predicate device used to demonstrate substantial equivalence to the Dimension Vista® Chemistry 3 Calibrator (CHEM 3 CAL) is the Dimension Vista® Chemistry 3 Calibrator (CHEM 3 CAL) previously cleared under k062334.

7. Device Description:

The Dimension Vista® Ammonia assay (AMM) is an enzymatic method that uses glutamate dehydrogenase (GLDH) and a stabilized NADPH analog. Ammonia reacts with α-ketoglutarate and reduced cofactor to form L-glutamate and the cofactor. The reaction is catalyzed by glutamate dehydrogenase. The decrease in absorbance due to the oxidation of the reduced cofactor is monitored at 340/700 nm and is proportional to the ammonia concentration.

$$\alpha\text{-ketoglutarate} + NH_4^+ + \text{reduced cofactor} \xrightarrow{\text{GLDH}} \text{L-glutamate} + \text{cofactor} + H_2O$$

The Dimension Vista® Ammonia (AMM) Flex® reagent cartridge is an *in vitro* diagnostic device that consists of prepackaged reagents in a plastic cartridge for use on the Dimension Vista® System. Flex® reagent cartridges hold reagents for a test method. Each Dimension Vista® Flex has twelve wells.

Reagents

Wells[a]	Form	Ingredient	Concentration[b,c]	Source
1 – 12	Liquid	α-ketoglutarate	10 mmol/L	Microbial
		GLDH	≥ 24 KU/L	
		NADPH	0.2 mmol/L	

a. Wells are numbered consecutively from the wide end of the cartridge.
b. Nominal value per well in a cartridge.
c. Contain buffers, stabilizers and preservatives.

Reagent preparations are performed automatically on the instrument. A barcode label on the cartridge identifies the test method, lot number, expiration date and maximum number of tests for which the cartridge can supply reagent.

The Dimension Vista® Chemistry 3 Calibrator (CHEM 3 CAL) is a two level, liquid calibrator. It is packaged as a kit of six vials with 2.5 mL per vial. The product is a multi-analyte, aqueous product containing ammonium bicarbonate, sodium carbonate and ethyl alcohol. This product is sold separately from the Flex® reagent cartridge.

8. Intended Use:

The AMM method is an *in vitro* diagnostic test for the quantitative measurement of ammonia in human plasma on the Dimension Vista® System. Ammonia measurements are used in the diagnosis and treatment of severe liver disorders such as cirrhosis, hepatitis and Reye's syndrome.

The CHEM 3 CAL is an *in vitro* diagnostic product for the calibration of Ammonia (AMM), Carbon Dioxide (CO2) and Ethyl Alcohol (ETOH) methods on the Dimension Vista® System.

9. Indication(s) for Use:

The AMM method is an *in vitro* diagnostic test for the quantitative measurement of ammonia in human plasma on the Dimension Vista® System. Ammonia measurements are used in the diagnosis and treatment of severe liver disorders such as cirrhosis, hepatitis and Reye's syndrome.

The CHEM 3 CAL is an *in vitro* diagnostic product for the calibration of Ammonia (AMM), Carbon Dioxide (CO2) and Ethyl Alcohol (ETOH) methods on the Dimension Vista® System.

10. Substantial Equivalence Information:

Both the Dimension Vista® Ammonia Flex® reagent cartridge (AMM) assay and the predicate Dimension® Ammonia Flex® reagent cartridge (AMON) assay employ prepackaged reagents for use on automated clinical chemistry test systems. A comparison of the similarities and differences between the devices is provided in the following tables.

Note: Siemens has decided to offer our customers both conventional units and Systéme International d'Unités (SI units) in the Instructions for Use (IFU). The predicate, Dimension® Ammonia (AMON) assay results are reported in SI Units only. All data supplied in **Appendix C** will include both conventional units and SI Units for ease of review. Raw data was collected from the instruments in SI units and the conventional units were calculated using the following equation: µg/dL x 0.587 = [µmol/L].

Similarities for Dimension Vista® AMM assay:

Feature	**New Device : Dimension Vista® Ammonia Flex® reagent cartridge (AMM)**	**Predicate: Dimension® Ammonia Flex® reagent cartridge (AMON) k863840**
Intended Use	The AMM method is an *in vitro* diagnostic test for the quantitative measurement of ammonia in human plasma on the Dimension Vista® System. Ammonia measurements are used in the diagnosis and treatment of severe liver disorders such as cirrhosis, hepatitis and Reye's syndrome.	The AMON method used on the Dimension® clinical chemistry system is an *in vitro* diagnostic test intended for the quantitative determination of ammonia in human plasma.
Format	Prepackaged for use on an automated system.	Prepackaged for use on an automated system.
Measurement	Bichromatic Rate	Bichromatic Rate

Differences for Dimension Vista® AMM assay:

Feature	**New Device: Dimension Vista® Ammonia Flex® reagent cartridge (AMM)**	**Predicate: Dimension® Ammonia Flex® reagent cartridge (AMON) k863840**
Measuring Range	17-1277 µg/dL [10 - 750 µmol/L]	0 - 1000 µmol/L
Sample Type	Plasma (Lithium Heparin and EDTA)	Plasma (EDTA, Lithium Heparin, Sodium Fluoride)
Reagent Form	Liquid	Tablet
Units	µg/dL and µmol/L	µmol/L
Sample Size	20 µL	53 µL

Similarities for Dimension Vista® CHEM 3 CAL:

Feature	New Device: Dimension Vista® Chem 3 Calibrator (CHEM 3 CAL) (KC130A)	Predicate: Dimension Vista® Chem 3 Calibrator (CHEM 3 CAL) (KC130)
Intended Use	The CHEM 3 CAL is an *in vitro* diagnostic product for the calibration of Carbon Dioxide (CO2) and Ethyl Alcohol (ETOH) methods on the Dimension Vista® System.	The CHEM 3 CAL is an *in vitro* diagnostic product for the calibration of Carbon Dioxide (CO2) and Ethyl Alcohol (ETOH) methods on the Dimension Vista® System.
Preparation	Liquid: Ready to use	Liquid: Ready to use
Storage	2 – 8 °C	2 – 8 °C
Traceability	AMM – ASC Grade Ammonium Sulfate ECO2 – NIST SRM 351 ETOH – USP Grade Ethyl Alcohol	AMM – ASC Grade Ammonium Sulfate ECO2 – NIST SRM 351 ETOH – USP Grade Ethyl Alcohol
Matrix	Aqueous product containing ethyl alcohol, ammonium bicarbonate and sodium carbonate.	Aqueous product containing ethyl alcohol, ammonium bicarbonate and sodium carbonate.
Target Concentrations	EC02 - CAL A - 0 mmol/L CAL B – 50 mmol/L ETOH - CAL A – 0 mg/dL CAL B – 315 mg/dL	EC02 - CAL A - 0 mmol/L CAL B – 50 mmol/L ETOH - CAL A – 0 mg/dL CAL B – 315 mg/dL

Differences for Dimension Vista® CHEM 3 CAL

Feature	New Device: Dimension Vista® Chem 3 Calibrator (CHEM 3 CAL) (KC130A)	Predicate: Dimension Vista® Chem 3 Calibrator (CHEM 3 CAL) (KC130)
Intended Use	The CHEM 3 CAL is an *in vitro* diagnostic product for the calibration of Ammonia (AMM method on the Dimension Vista® System.	The CHEM 3 CAL is an *in vitro* diagnostic product for the calibration of Ammonia (AMON), method on the Dimension Vista® System.
Target Concentrations for AMM	Calibrator A: 0 µg/dL[µmol/L] Calibrator B: 1405 µg/dL [825 µmol/L]	Calibrator A: 0 µmol/L Calibrator B: 1000 µmol/L
Units	µg/dL and µmol/L	µmol/L

11. Standard/Guidance Document Reference:

- Evaluation of Precision Performance of Quantitative Measurement in Methods; Approved Guideline (EP5-A2)
- Evaluation of the Linearity of Quantitative Measurement Procedures; A Statistical Approach; Approved Guideline (EP6-A)
- Interference Testing in Clinical Chemistry; Approved Guideline (EP7-A2)
- Method Comparison and Bias Estimation Using Patient Samples; Approved Guideline (EP9-A2)
- Protocols for Determination of Limits of Detection and Quantitation; Approved Guideline (EP17-A)
- Defining, Establishing, and Verifying Reference Intervals in the Clinical Laboratory; Approved Guideline (C28-A3)
- Evaluation of Stability of *In-Vitro* Diagnostic Reagents; Approved Guideline (EP25-A)

12. Performance Characteristics

The following data represent typical performance for the Dimension Vista® System and were collected on a Dimension Vista® 1500 System.

Method Comparison

Split sample comparison between the Dimension Vista® Ammonia (AMM) assay and the Dimension Vista® Ammonia (AMON) assay gave the following correlation statistics, when tested with patient samples:

Dimension Vista® Ammonia (AMM) vs. Predicate

Dimension Vista®	Predicate	Slope	Intercept µg/dL [µmol/L]	Correlation Coefficient (r)	n
AMM	Dimension® AMON	1.03	13.6 µg/dL [8.0 µmol/L]	0.993	100

Plasma Equivalency Comparison

To demonstrate equivalency between lithium heparin plasma and EDTA plasma for Dimension Vista® AMM assay, comparison testing of 49 fresh matched lithium heparin and EDTA plasma samples were tested on the Dimension Vista® System and gave the following linear regression statistics:

Plasma Equivalency Comparison Data

Lithium Heparin vs.	Slope	Intercept µg/dL [µmol/L]	Correlation Coefficient (r)	n
EDTA	0.96	3.3 [2.0]	1.00	49

Reference Interval (Expected Values)

The reference interval of 19 – 54 µg/dL [11 – 32 µmol/L] for the predicate was validated for use with the Dimension Vista® Ammonia (AMM) assay by transference following CLSI C28-A3 *Defining, Establishing, and Verifying Reference Intervals in the Clinical Laboratory – Approved Guideline – Third Edition.* The literature reference used was the *Textbook of Clinical Chemistry* by NW Tietz; WB Saunders Co., Philadelphia, PA; pages 1487-1488.

Expected Values: 19 - 54 µg/dL [11 – 32 µmol/L]

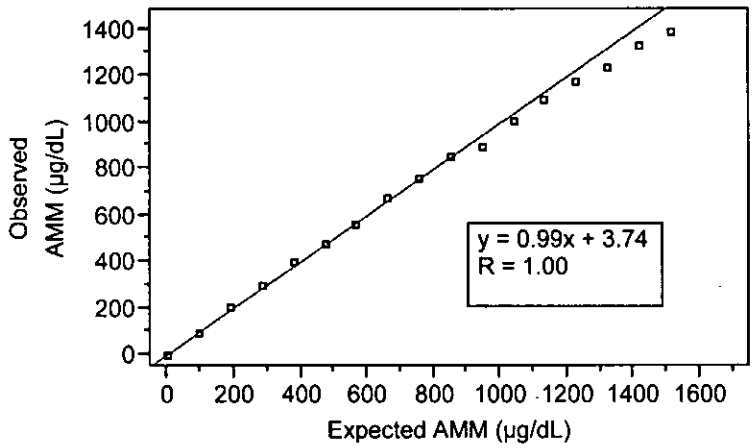
Precision

Precision testing was performed in accordance with CLSI EP5-A2 *Evaluation of Precision Performance of Quantitative Measurement Methods; Approved Guideline – Second Edition.* Samples consisted of three levels of Liquicheck™ Ethanol/Ammonia control. Testing was performed over 20 days, two separate runs with two test samples for each test material. Analysis of variance (ANOVA) was used to evaluate the data consistent with the recommendations of EP5-A2. The data are summarized in the following Dimension® Ammonia (AMM) Summary Table:

	Mean		Standard Deviation (%CV)	
			Repeatability	Within-Lab
Material	µg/dL	[µmol/L]	µg/dL [µmol/L] %CV	
Liquichek™ Ethanol/Ammonia control				
Level 1	44	[26]	2.7[1.6] (6.1)	3.3[1.9] (7.5)
Level 2	186	[109]	2.3 [1.4] (1.2)	3.2 [1.9] (1.7)
Level 3	563	[331]	3.5 [2.1] (0.6)	5.0 [2.9] (0.9)

Linearity

The linear range was determined according to CLSI EP-6A, *Evaluation of the Linearity of Quantitative Measurement Procedures; A Statistical Approach; Approved Guideline.* Based on the results of this testing and the Limit of Detection testing on the Dimension Vista® System, the analytical measurement range was determined to be 17 – 1277 µg/dL [10 – 750 µmol/L].



Analytical Specificity/Interferences

Interfering Substances

The AMM assay was evaluated for interference according to CLSI EP7-A2 *Interference Testing in Clinical Chemistry; Approved Guideline – Second Edition.* Bias is the difference in the results between the control sample (without the interferent) and the test sample (contains the interferent) expressed in percent. Bias exceeding 10% is considered interference.

Substance Tested	Substance Concentration	Ammonia µg/dL [µmol/L]	Bias %
Hemoglobin	75 mg/dL [0.05 mmol/L]	85 [50]	+12
(hemolysate)	500 mg/dL [0.62 mmol/L]	426 [250]	+17
Bilirubin	80 mg/dL [1026 µmol/L]	85 [50]	<10
(unconjugated)		426 [250]	<10
Bilirubin	60 mg/dL [1026 µmol/L]	85 [50]	-16
(conjugated)	80 mg/dL [1368 µmol/L]	426 [250]	<10
Lipemia	50 mg/dL [0.565 mmol/L]	85 [50]	+13
(Intralipid®)	50 mg/dL [0.565 mmol/L]	426 [250]	<10

See Limitations of Procedure for complete listing of substances that exceeded a bias of <10%.

Studies were also performed following CLSI EP7-A2 for Interference Testing of exogenous substances at ammonia concentrations of 85 µg/dL [50 µmol/L] and 426 µg/dL [250 µmol/L] and were found not to interfere with the AMM method when present in plasma. Inaccuracies (biases) were all less than 10%. See Dimension® AMM Instructions for Use for a full list of substances tested.

The AMM assay was evaluated for interference according to CLSI/NCCLS EP7-A2. Bias is the difference in the results between the control sample (without the interferent) and the test sample (contains the interferent) expressed in percent. Bias exceeding 10% is considered interference. Testing was performed at two levels of analyte concentration.

Analyte Test Level	**85 µg/dL [50 µmol/L]**		
Interferent	**[Test] mg/dL**	**[Test] SI Units**	**Bias (%)**
Albumin	6 g/dL	60 g/L	49
Bilirubin (conjugated)	60mg/dL	1026 µmol/L	-16
Cholesterol	503 mg/dL	13 mmol/L	65
Creatinine	30 mg/dL	2.65 mmol/L	34
Dextran 40	500 mg/dL	125 µmol/L	13
Hemoglobin	75 mg/dL	0.05 mmol/L (monomer)	12
Immunoglobulin G	5 g/dL	50 g/L	30
Lipemia (Intralipid®)	50 mg/dL	0.5 g/L	13
Triglycerides	3000 mg/dL	33.9 mmol/L	*
Uric Acid	20 mg/dL	1.2 mmol/L	43

*Tripped a test report message; therefore magnitude of the interference could not be determined.

Analyte Test Level	**426 µg/dL [250 µmol/L]**		
Interferent	**[Test] mg/dL**	**[Test] S.I. Units**	**Bias (%)**
Albumin	6 g/dL	60 g/L	15
Cholesterol	503 mg/dL	13 mmol/L	34
Dextran 40	3000 mg/dL	750 µmol/L	16
Hemoglobin	500 mg/dL	0.31 mmol/L	17
Uric Acid	20 mg/dL	1.2 mmol/L	17

For certain endogenous interferents which exceeded 10 % bias, an aliquot of patient sample containing the potential interferent (test) was mixed with equal parts of a plasma pool containing approximately 85 µg/dL [50 µmol/L] ammonia (control). Test samples and control samples were processed and percent recovery calculated from expected and observed values. No significant interference was observed based on recovery within 10% of expected value.

Substance Tested	Test Concentration		AMM concentration	
	conventional	SI unit	µg/dL	[µmol/L]
Albumin	5.4 g/dL	54 g/L	182	[107]
Cholesterol	364 mg/dL	9.7 µmol/L	232	[136]
Creatinine	21.1 mg/dL	1.87 mmol/L	233	[137]
Immunoglobulin G	3.4 g/dL	34 g/L	308	[181]
Triglyceride	1102 mg/dL	12.3 mmol/L	354	[208]
Uric Acid	9.3 mg/dL	0.6 mmol/L	196	[115]

Limit of Blank, Limit of Determination and Limit of Quantitation

The Limit of Blank (LoB), Limit of Detection (LoD) and Limit of Quantitation (LoQ) was evaluated in accordance with CLSI EP17-A Protocols for Determination of Limits of Detection and Limits of Quantitation; Approved Guideline. Studies were performed on the Dimension® clinical chemistry analyzer with the following results:

Dimension® Ammonia (AMM)		
Limit	**Protocol**	**Value**
LoB	4 blank samples were tested for 3 days, one run per day, 2 replicates per run, 2 reagent lots, 1 instrument	4 µg/dL [2 µmol/L]
LoD	4 low level ammonia samples were tested for 3 days, one run per day, 2 replicates per run, 2 reagent lots, 1 instrument	15 µg/dL [9 µmol/L]
LoQ	3 low level samples diluted with purified water were tested for 3 days, one run per day, 3 replicates per run, 2 reagent lots, 1 instrument	17 µg/dL [10 µmol/L]

These results support the claims of a LoB of 9 µg/dL [5 µmol/L], 17 µg/dL [10 µmol/L] for LoD and 17 µg/dL [10 µmol/L] for LoQ.

Calibrator

- Once the vial is punctured, assigned values are stable for 24 hours stored on the Dimension Vista® System.
- Once cap is removed, assigned values are stable for 30 days when recapped immediately after use and stored at 2-8°C. Do not use this vial on board the instrument.

The shelf life of the Dimension Vista® CHEM 3 CAL is 12 months.

13. Conclusion: The Dimension Vista® Ammonia (AMM) Flex® reagent cartridge assay and the associated Dimension Vista® Chemistry 3 Calibrator (CHEM 3 CAL) are substantially equivalent in principle and performance to the predicates, Dimension® Ammonia (AMON) assay and the Dimension Vista® Chemistry 3 Calibrator (CHEM 3 CAL) calibrator respectively.

DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service

Food and Drug Administration
10903 New Hampshire Avenue
Document Control Center – WO66-G609
Silver Spring, MD 20993-0002

March 7, 2013

Siemens Healthcare Diagnostics, Inc.
c/o Rose T. Marinelli
P.O. Box 6101
500 GBC Drive, M/S 514
Newark, DE 19702

Re: k123677
Trade/Device Name: Dimension Vista Ammonia Flex reagent cartridge (AMM) and Dimension Vista Chemistry 3 Calibrator (CHEM 3 CAL)
Regulation Number: 21 CFR 862.1065
Regulation Name: Ammonia test system
Regulatory Class: Class I, reserved
Product Code: JIF, JIX
Dated: January 31, 2013
Received: February 01, 2013

Dear Ms. Marinelli:

We have reviewed your Section 510(k) premarket notification of intent to market the device referenced above and have determined the device is substantially equivalent (for the indications for use stated in the enclosure) to legally marketed predicate devices marketed in interstate commerce prior to May 28, 1976, the enactment date of the Medical Device Amendments, or to devices that have been reclassified in accordance with the provisions of the Federal Food, Drug, and Cosmetic Act (Act) that do not require approval of a premarket approval application (PMA). You may, therefore, market the device, subject to the general controls provisions of the Act. The general controls provisions of the Act include requirements for annual registration, listing of devices, good manufacturing practice, labeling, and prohibitions against misbranding and adulteration. Please note: CDRH does not evaluate information related to contract liability warranties. We remind you, however, that device labeling must be truthful and not misleading.

If your device is classified (see above) into either class II (Special Controls) or class III (PMA), it may be subject to additional controls. Existing major regulations affecting your device can be found in the Code of Federal Regulations, Title 21, Parts 800 to 898. In addition, FDA may publish further announcements concerning your device in the Federal Register.

Please be advised that FDA's issuance of a substantial equivalence determination does not mean that FDA has made a determination that your device complies with other requirements of the Act or any Federal statutes and regulations administered by other Federal agencies. You must comply with all the Act's requirements, including, but not limited to: registration and listing (21 CFR Part 807); labeling (21 CFR Part 801); medical device reporting (reporting of medical device-related adverse events) (21 CFR 803); good manufacturing practice requirements as set forth in the quality systems (QS) regulation (21 CFR Part 820); and if applicable, the electronic product radiation control provisions (Sections 531-542 of the Act); 21 CFR 1000-1050.

If you desire specific advice for your device on our labeling regulation (21 CFR Part 801), please go to http://www.fda.gov/AboutFDA/CentersOffices/CDRH/CDRHOffices/ucm115809.htm for the Center for Devices and Radiological Health's (CDRH's) Office of Compliance. Also, please note the regulation entitled, "Misbranding by reference to premarket notification" (21CFR Part 807.97). For questions regarding the reporting of adverse events under the MDR regulation (21 CFR Part 803), please go to http://www.fda.gov/MedicalDevices/Safety/ReportaProblem/default.htm for the CDRH's Office of Surveillance and Biometrics/Division of Postmarket Surveillance.

You may obtain other general information on your responsibilities under the Act from the Division of Small Manufacturers, International and Consumer Assistance at its toll-free number (800) 638-2041 or (301) 796-7100 or at its Internet address http://www.fda.gov/MedicalDevices/ResourcesforYou/Industry/default.htm.

Sincerely yours,

Carol C. Benson -S for

Courtney H. Lias, Ph.D.
Director
Division of Chemistry and Toxicology Devices
Office of In Vitro Diagnostics
and Radiological Health
Center for Devices and Radiological Health

Enclosure

Indications for Use

510(k) Number (if known): k123677

Device Name: **Dimension Vista® Ammonia Flex® reagent cartridge (AMM)**

Indications for Use:

The AMM method is an *in vitro* diagnostic test for the quantitative measurement of ammonia in human plasma (heparin or EDTA) on the Dimension Vista® System. Ammonia measurements are used in the diagnosis and treatment of severe liver disorders such as cirrhosis, hepatitis and Reye's syndrome

Prescription Use ___X___ And/Or Over the Counter Use ____.
(21 CFR Part 801 Subpart D) (21 CFR Part 801 Subpart C)

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Concurrence of CDRH, Office of In Vitro Diagnostics and Radiological Health (OIR)

Yung W. Chan -S

Division Sign-Off
Office of In Vitro Diagnostics and Radiological Health

510(k) k123677

Indications for Use

510(k) Number (if known): k123677

Device Name: **Dimension Vista® Chemistry 3 Calibrator (CHEM 3 CAL)**

Indications for Use:

The CHEM 3 CAL is an *in vitro* diagnostic product for the calibration of Ammonia (AMM), Carbon Dioxide (C02) and Ethyl Alcohol (ETOH) methods on the Dimension Vista® System.

Prescription Use ___X___ And/Or Over the Counter Use ____.
(21 CFR Part 801 Subpart D) (21 CFR Part 801 Subpart C)

(PLEASE DO NOT WRITE BELOW THIS LINE; CONTINUE ON ANOTHER PAGE IF NEEDED)

Concurrence of CDRH, Office of In Vitro Diagnostics and Radiological Health (OIR)

Yung W. Chan -S

Division Sign-Off
Office of In Vitro Diagnostics and Radiological Health

510(k) k123677